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U. S. DEPARTMENT OF AGRICULTURE
FARMERS' BULLETIN No. 1440

MORE PROFIT *for the* WHEAT FARMERS OF CENTRAL KANSAS

FARMING in the winter-wheat belt of Kansas may be made more profitable (1) by growing more wheat with the same expenditure of labor, equipment, and materials; (2) by growing the same quantity of wheat with less labor, equipment, and materials; or (3) by adding to the work of wheat growing other lines of production that will increase the returns more than the expenses. This bulletin suggests ways in which farmers in this region can do one or more of these things.

Harvesting wheat and putting in the next year's crops are done between the middle of June and the last of October. Limited acreages of corn, oats, alfalfa, Sudan grass, kafir, and the sorgos do not seriously interfere with the production of wheat. A few milk cows, beef cattle, hogs, and chickens provide a means of utilizing farm-grown roughages, wheat pasture, and other feeds produced. These feed crops and livestock give the farmer a profitable return for time not needed in the wheat field.

Twenty-five farmers in McPherson County, Kans., cooperated with the United States Department of Agriculture and the Kansas Agricultural Experiment Station in keeping daily records on their farming business. The farms from which this information was obtained are representative of the usual types of farming in the wheat-growing districts of central Kansas. (Complete analysis of these records is contained in Department Bulletin No. 1296, A Study of Farm Organization in Central Kansas.)

Washington, D. C. Issued November, 1924

MORE PROFIT FOR THE WHEAT FARMERS OF CENTRAL KANSAS

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RISKS OF WHEAT FARMING

WHEAT is the most dependable cash crop that can be grown on a large scale in central Kansas. Corn, oats, and alfalfa are other important crops, but they are grown primarily for feed. The hot, dry weather of July and August often seriously damages the corn crop before the grain matures. Kafir, milo, Sudan grass, feterita, and the sorgos stand the dry weather better than corn. Small acreages of these crops are grown on most farms and used as feed for livestock.

Even wheat is not a sure crop in this region every year. In McPherson County, for example, the yield of wheat per acre has been as high as 26 bushels in 1882 and 1883 and as low as 3 bushels in 1895. (See fig. 1.)

Not only are the yields of wheat sometimes low, but often a part of the wheat fails to come through the winter in good condition and is not worth cutting. Some years this amounts to a large part of the crop. The seasons of 1885 to 1887 were very unfavorable for the crops, and the acreage of wheat cut in the county dropped from 158,000 acres in 1884 to 28,000 in 1887. During these years only 44 per cent of the sown acreage of wheat was harvested. This was very discouraging and many farmers left the county. From 1893 to 1895 the price of wheat and the yield per acre were both low and this caused a smaller wheat acreage in 1896 and 1897.

One of the worst years for the farmers of McPherson County was 1910. The fall and winter of 1909 were very hard on the wheat, and the acreage of wheat cut in 1910 was only 6 per cent of the 1909 acreage. Again in 1912 and 1917 a large part of the wheat was abandoned and the land put into spring crops. During the entire period from 1910 to 1922, about 117 acres of wheat was sown in this county for every 100 acres harvested.

These experiences of McPherson County farmers are typical of what happens from time to time over the entire winter-wheat belt of central Kansas. In spite of such discouragement the farmers of central Kansas have continued to depend upon wheat as their most important source of cash income. When the wheat has failed them, they have given more attention to growing corn, oats, and other feed

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crops and have kept more cattle and hogs. But with every improvement in the price or yield of wheat, there is a strong tendency to give less attention to other things. However, because of the uncertainty of the wheat crop as shown by the years when a large proportion of the sown acreage was not worth cutting, and by the variations in the yield per acre from year to year, it is not advisable for farmers in this district to depend upon wheat as their only source of income

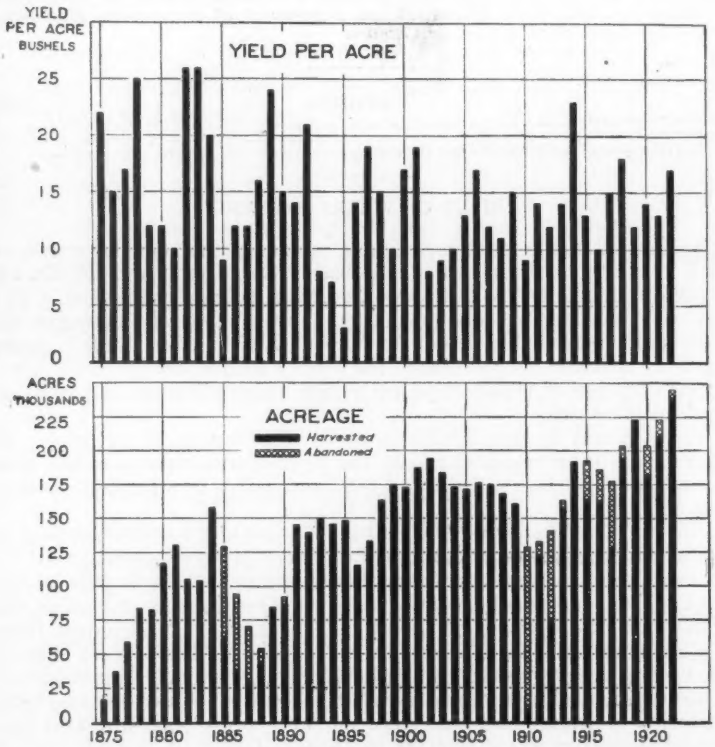

FIG. 1.—Acreage and yield of wheat in McPherson County, Kans., from 1875 to 1922. The amount of wheat harvested per acre in this region is much higher some years than others. Unless the farmer has other things to sell when the wheat crop is poor, he finds it hard to pay the expenses of running the farm

GREATER EFFICIENCY IN WHEAT GROWING

Every wheat farmer in this district should grow all the wheat that he can sow in good condition in the fall without having to hire a great deal of labor for this work or make too large an investment in horses, plows, disks, drills, etc. This will be about 160 acres of wheat on farms where most of the work is done by one regular man, with extra help during harvest and a little other help at different times during the year. This is also about the maximum acreage that can be cut with one binder during the usual period available for binding wheat.

FIG. 2.—Plowing wheat stubble in central Kansas. Wheat usually follows wheat in this area and the land is practically all plowed or listed. Plowing is from 5 to 6 inches deep and is usually followed by one or two harrowings before seeding

FIG. 3.—A 2-row lister in central Kansas. Listing can be done more rapidly than plowing and is sometimes preferred when weather conditions indicate that the soil will dry out rapidly and be hard to work

The acreage of wheat that one man can grow with some help in harvest depends primarily upon the kind of operations and the time used for each operation. Records kept on 25 farms in McPherson County show that with good management the farmer can come up to the following standards in getting the various operations done.

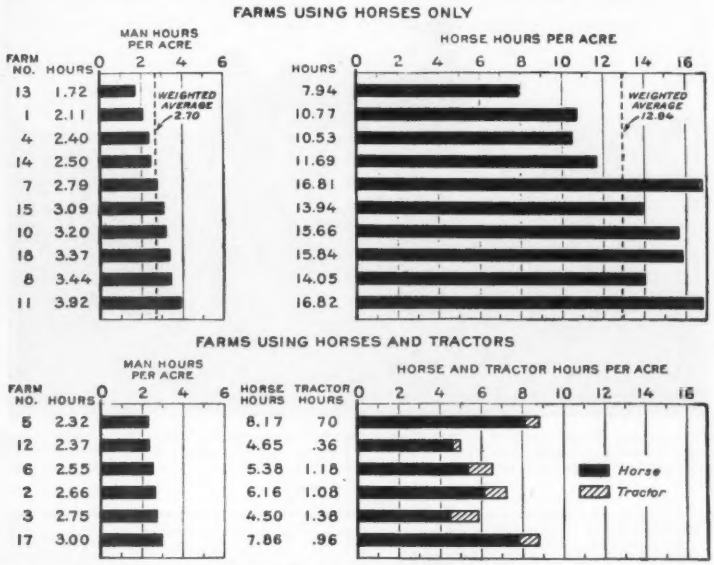

FIG. 4.—Some farmers use twice as much time for putting in their wheat as others use. The size of the implements used, the kind and amount of power used, the condition of the land, the number and kind of operations performed, and the persons doing the work are responsible for these differences

Standard requirements for wheat operations[1]

Operation	Size and type of equipment	Acres per 10-hour day
Plowing	2-bottom gang plow and 5 horses	5.6
	2-bottom gang plow and 4 horses	4.4
	16-inch sulky plow and 3 horses	3.3
Disking	8-foot disk and 4 horses (single disking)	20.0
Harrowing	3-section harrow and 5 horses	35.0
Drilling	8-foot drill and 4 horses	20.0
Listing	1-row lister and 4 horses	10.0
	Working down ridges 2-row, 4 horses	20.0
Binding	7-foot binder, 4 horses (14-bushel yield)	13.3
Shocking	(14-bushel yield)	13.3
Stacking bundles	3 men and 2 teams (14-bushel yield)	20.0
Heading	6 men and 10 horses with 10-foot header (14 bushel yield)	30.0

[1] In computing these standards, allowance is made for time that must be used in going to and from fields, adjusting machinery, making minor emergency repairs in the field, and similar operations.

In central Kansas there are wide differences between farms in the time of men and horses used in growing wheat. (See fig. 4.) Some farmers come up to these standards in getting their work done; a few do better. Many others can come up to them and grow more wheat with the same labor and equipment or the same amount of wheat

with less labor. By comparing what he does on his own farm with the standards given, the farmer can decide whether he is taking too much time in producing his wheat.

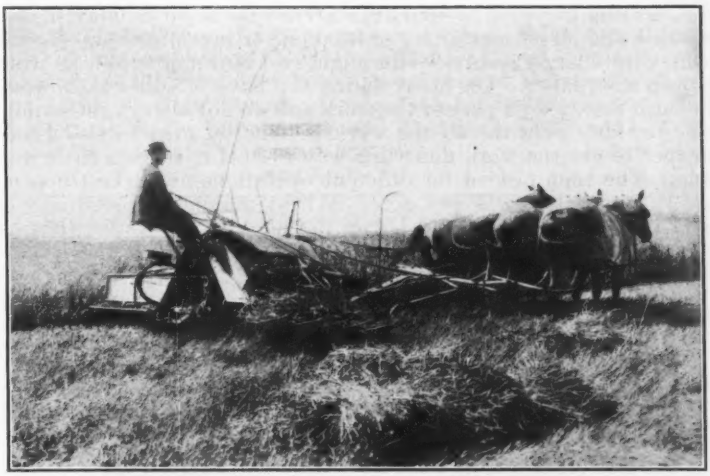

FIG. 5.—A binder in a central Kansas wheat field. Wheat is usually cut with a binder and shocked and some of the bundle grain is usually stacked. The shocked grain is threshed as soon as possible after it is cut

FIG. 6.—A header is used when the wheat straw is short. Farmers with large areas in wheat frequently bind until the wheat is dry enough to head and then head the rest of the crop

To grow wheat with a small number of man hours per acre without omitting any important operations, the farmer must use large-size implements with a large amount of power and have fields of such size and shape that they can be operated efficiently. For example, the hours of man labor needed to plow an acre of land depend pri-

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marily upon the size of the plow and the amount of power used. Most of the wheat fields or farms in this area are of such size and shape that large machines can be used to advantage.

But the farmer does not always want to grow his wheat with the smallest number of man hours per acre. To do so he may have to buy new and larger machinery or keep one or two more horses so that he may have larger teams. This might cost him more than he would save in man labor. On many farms the boys or other members of the farm family do a part of the work and do not always get so much done per day as when all the work is done by men. It is usually cheaper to get the work done this way even if it takes a little more time. The time needed for different operations at harvest depends largely upon the yield per acre. Wheat making the higher yield takes more time of men and horses per acre for harvesting, but less

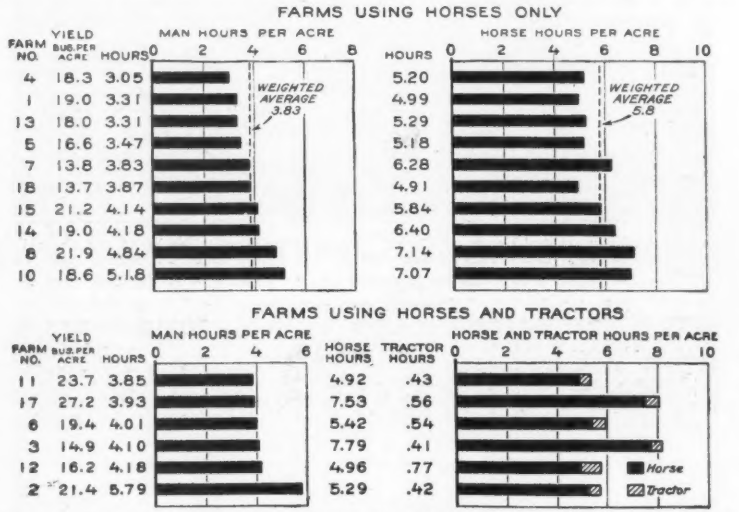

FIG. 7.—Tractors usually do not save man labor in harvesting wheat, as two men are ordinarily used one on the tractor and one on the binder. Two and three horse teams were used for binding on farms, 8 and 10. These hours do not include the time used in hauling the wheat from the thresher

time per bushel. The most efficient wheat grower is the one who secures the most wheat with a given expenditure of labor, horse work, and materials.

Many practices make for greater efficiency in wheat production although they may take more of the farmer's time. Early plowing for wheat increases the chance for a good yield; and, if the land is plowed deep, it also helps to prevent Hessian fly damage. Wherever possible, the land should be plowed in July or the first half of August to get the best results. Deep plowing (about 7 inches), if done early, is much better than shallow plowing. Listing is satisfactory if done early; it is more rapid than plowing, and more ground can be turned early in the season than if it is plowed. Growing wheat in rotation with legumes and the use of manure help to keep up the fertility of the soil and to increase the yield of wheat per acre. (For full in-

formation on these points, see Kansas Agricultural Experiment Station Bulletin No. 219.)

High-yielding varieties of seed that are resistant to winter killing and rust should be used, because they help to increase the yield without greatly increasing the cost. A pure variety usually gives higher yields than a mixture of two or more varieties. Whenever there is danger of damage by Hessian fly, the wheat seeding should be delayed until after the fly-free date. If no flies are present, the seeding should begin earlier to allow the wheat to get a start before winter. (For full information see Bulletin 219 and Technical Bulletin 11 of the Kansas Agricultural Experiment Station.)

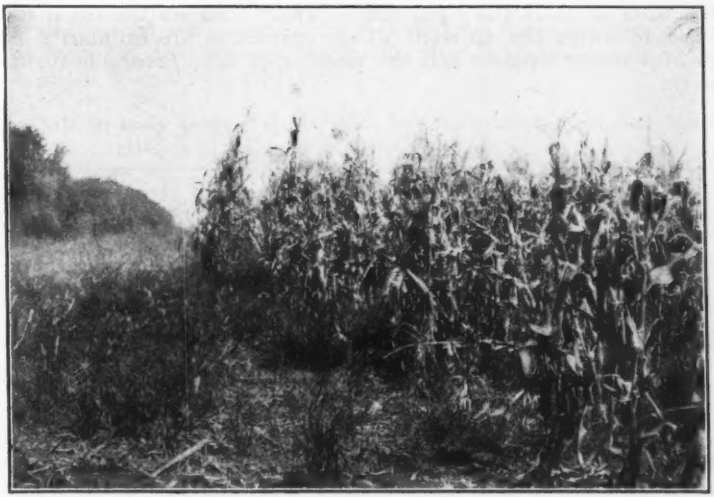

FIG. 8.—Corn is often seriously damaged by the hot, dry weather of July and August before any grain matures. The stover or fodder is usually fed to cows, beef cattle, or work stock

ADDING OTHER LINES TO PRODUCTION OF WHEAT FARMING

Wheat is the best income-producing crop in this district and other lines of production must fit in with it. The first step in planning the farm is to grow as much wheat as possible with good methods without having to hire a great deal of labor for seed-bed preparation and seeding work. The next step is to choose the kinds and quantities of other crops and the kinds and numbers of livestock that will make the best use of time and equipment when they are not needed on the wheat. The crops grown and the livestock kept must be so selected that there will be enough feed for the livestock and enough livestock to eat up the feed. In this region the crop yields are uncertain. Consequently several kinds of feed crops should be grown and they should provide enough feed for the livestock in the poorer years. Hay and roughage can be carried over from years of good yields to years when the yields are low and feeds scarce.

Kafir, milo, Sudan grass, feterita, and the sorghums stand the dry weather better than corn (fig. 8). Small acreages of one or two of

these crops should be grown, as they insure a supply of rough feeds and the work of growing them does not seriously interfere with the wheat.

The busy time on wheat is from the middle of June to the middle of October. Some stacked grain is threshed and some wheat seeded after October. Hauling grain from the bin to the elevator may be done at any time during the year and does not take up a large part of a farmer's time. Most of the other operations must be done at rather definite times, although the best time for doing such things as seeding and cutting wheat is never exactly the same from year to year on account of the different weather conditions. In planning the work for the year, a farmer needs to keep in mind the usual dates for doing different operations so that he can plan to get all the work done at the right time. Table 1 shows the usual dates between which the different wheat operations are ordinarily done in McPherson County and the number of days favorable for field work.

Usual dates for performing different operations in growing wheat in McPherson County, Kans.

Operation	Dates	Days ordinarily available for field work
Plowing or listing for wheat	July 15 to Aug. 31	36
Disking or harrowing	Sept. 10 to Oct. 5	17
Drilling	Sept. 25 to Oct. 15	14
Binding and shocking or heading	June 20 to July 8	12
Stacking	July 5 to July 20	10
Shock threshing	July 10 to July 31	15

To illustrate the importance of combining other enterprises with wheat growing, the results obtained on a McPherson County farm may be taken as an example. This farm is typical, in the crops and livestock produced, of most of the wheat farms of central Kansas. It is assumed that this farmer wants to find out whether he can make more from farming by continuing with his present system, which consists primarily of wheat growing, or by cutting down on wheat and giving more attention to feed crops and livestock. It is further assumed that when he is making his plans, this farmer decides that for the coming year he can count on the following prices at the farm for the things which he expects to have to sell: Wheat, 90 cents per bushel; butterfat, 37½ cents per pound; pork, 7 cents per pound; beef, 4½ cents per pound; poultry, 17½ cents per pound; eggs, 23 cents per dozen. As to crop yields, he can count on the average yields that he gets, one year with another, on his own farm. Using these yields and prices, the following comparison can be made between the present system of running the farm and a system where more feed crops and livestock and less wheat are produced:

Present cropping system

	Acres of crops	Yield per acre	Total
	Acres	*Bushels*	*Bushels*
Wheat	212	14	2,968
Corn	21	20	420
Oats	24	25	600
Kafir	16	15	240
Total crop area	273		
Pasture	38		
Farmstead	5		
Total farm area	316		

All of the corn, oats, and kafir grown and the roughage from these crops were fed to livestock. After keeping out enough wheat for seed, there were 2,700 bushels for sale.

LIVESTOCK

The production and value of the livestock and livestock products were as follows:

Number	Product	Value
4 cows	720 pounds butterfat at 37½ cents per pound	$270
4 young cattle	1,000 pounds beef at 4½ cents per pound	45
3 sows and their pigs	5,000 pounds pork at 7 cents per pound	350
120 chickens	480 pounds poultry at 17½ cents per pound	84
	700 dozen eggs at 23 cents per dozen	161
Total value of livestock products		910

CROP SALES

2,700 bushels of wheat, at 90 cents per bushel	$2,430
Total crop and livestock sales	3,340

The cost of materials and threshing for crops

	Twine	Threshing	Seed	Total
Wheat	$48	$356	(1)	$404
Corn	5		(1)	5
Oats	6	48	(1)	54
Kafir	4		$3	7
Total	63	404	3	470

[1] Grown on the farm.

COST OF MATERIALS FOR LIVESTOCK

Protein supplement for hogs	$17
Protein supplement for cattle	17
Grits and protein supplement for poultry	20
Salt	4
15 tons of hay	150
Total	208
Total cost of materials for crops and livestock	678
Cost of hired labor (principally for wheat and oats harvest)	300
Total costs of materials and labor	978

After deducting the costs of materials and labor ($978) from the total crop and livestock sales ($3,340) this farmer has a net return of $2,362 left for the use of his land, buildings, equipment, work horses, and for his own time and that of members of his family.

In this region the labor necessary for the rush work at harvest is usually very expensive. On this farm two men had to be hired to help with the cutting, shocking, and stacking from June 20 to the last of July. Help was also needed at threshing time and for some of the fall work on wheat. On 18 farms in McPherson County in 1922, 46 per cent of the labor used for harvesting and threshing wheat was hired. Forty-three per cent of the labor was done by the operator or members of his family and the remaining 11 per cent by exchange labor. On 7 farms where no family help was available, 61 per cent of the harvest labor was done by hired men and 11 per cent by exchanging with neighbors. The work of preparing the seedbed for

FIG. 9.—Alfalfa can be grown very easily in this region. It makes a good pasture for livestock and is the best hay crop of the region. A few hogs can be raised on alfalfa pasture, skim milk, and a little corn

wheat can be spread out over a longer period of time than the harvesting, and one man without any help can plow, or list, and prepare the seedbed for more acres of wheat than he can harvest. For this reason, hired labor is not used so much for this work as for harvesting.

What changes in crops and livestock will help to increase this farmer's net returns? In answering this question, it must be remembered that the primary need is for crops and livestock that will make the best use of the farmer's time, equipment, and work horses from October 15 to June 15 when there is little to do on the wheat. There is also some idle time between June and October that may be used for other crops without reducing the acreage of wheat that can be grown.

Cattle consume large quantities of straw, corn, and kafir fodder, and other rough feeds, and do well on wheat pasture when it is available. Beef cattle need more attention in winter and take but little of the farmer's time in summer when he is busy with the wheat. Milk cows, on the other hand, need some attention during all the year. However, by having the cows freshen in the fall, they do not

FIG. 10.—A field of Blackhull kafir in Kansas. Kafir, milo, Sudan grass, feterita, and the sorghums stand the dry weather better than corn

take much of the farmer's time during the busy season of wheat harvest and they provide a regular source of income out of which to pay current expenses. The work of feeding and caring for a few hogs may also be done without reducing appreciably the time spent in the field. (See fig. 9.)

PROPOSED CROPPING SYSTEM

More livestock means more feed crops and less wheat unless more land is to be rented or purchased. How the farmer's net returns would be affected by producing more feed crops and livestock and less wheat is shown below:

	Acres	Yield per acre	Total production
		Bushels	
Wheat	160	14	2,240, bushels
Oats	25	25	625 bushels.
Corn	30	20	600 bushels.
Kafir	18	25	270 bushels.
Alfalfa hay	18	2	36 tons.
Sudan grass	5	2	10 tons.
Sudan grass fo. pasture	10		
Alfalfa for pasture	7		
Native pasture	38		
Total	311		

All of the crops except wheat are for feed. After keeping out enough for seed and some for chicken feed, 2,000 bushels are left for sale. By using these feeds and the roughages, pasture, and skim milk available, the following livestock products could be produced.

Livestock and livestock products

Number	Product	Value
10 cows	2,000 pounds of butterfat at 37½ cents per pound	$750
15 young cattle	2,250 pounds of beef at 4½ cents per pound	101
5 sows and their pigs	8,000 pounds of pork at 7 cents per pound	560
200 chickens	800 pounds of poultry at 17½ cents per pound	140
	1,350 dozen eggs at 23 cents per dozen	310
Total value of livestock products		1,861
2,000 bushels wheat at 90 cents per bushel		1,800
Total crop and livestock sales		3,661

The cost of materials and threshing for crops

	Twine	Threshing	Seed	Total
Wheat	$36	$269	(1)	$305
Oats	6	50	(1)	56
Corn	7		(1)	7
Kafir	4		$4	8
Sudan			22	22
Total	53	319	26	398

[1] Grown on the farm.

Cost of materials for livestock:	
Protein supplement for cattle	$120
Protein supplement for hogs	20
Protein supplement for poultry	15
Veterinary services, medicine, horseshoeing, etc	25
Total	180
Total cost of materials for crops and livestock	578
Cost of hired labor	225
Total cost of labor and materials	803

After deducting the cost of material and labor ($803) from the crops and livestock sales ($3,661) this farmer would have $2,858 under this plan of operation in return for the use of his land, equipment, work horses and for his own time and that of members of his family. This is $496 ($2,858 − $2,362) more than the returns secured when fewer livestock, more wheat, and smaller acreages of feed crops were produced.

This plan of crop and livestock production would keep the farmer busy in winter and add almost $500 to his income from farming. It would mean an additional investment of not more than $500 in livestock. Some of this could be made over a period of years by producing breeding stock rather than borrowing the money to buy them. The interest and taxes on this additional investment would not be more than $40 or $50 per year which has not been allowed for

in the expenses. By cutting down the wheat acreage the farm work could be done with 8 horses instead of 10. Provision is made for increasing the production of butterfat per cow from 180 pounds to 200 pounds. This can be done by better feeding practices, particularly the use of more protein supplement in the ration. The cost of the additional protein supplement is included in the cost of materials.

Practically all work on these minor crops and livestock can be done without interfering with the work on wheat. Ample provision has been made for hired labor during busy seasons. It would ordinarily be possible to reduce the cost of hired labor as given by exchanging with neighbors. Although the change in organization means a larger investment in livestock, the cash expenses on these minor enterprises are small and most of the income received from them is net income. As such, it is a direct addition to the total net earnings of the farm business.

FIG. 11.—A few good cows give the farmer a good return for his time in winter and for the corn, alfalfa hay, wheat straw, and other rough feeds which can be grown along with the wheat

How would changes in the prices used in the illustration affect the results? Plans for the farm business must of necessity be based upon the prices which the farmer may expect to get for different products. Conservative prices for the livestock products are used in the example. As long as the production of livestock and the feed crops for them does not interfere seriously with wheat growing, a farmer can afford to include them in the business even if the prices for the products are low. When the price of wheat is low in relation to other things, time can be devoted to these other things more profitably than when the price of wheat is relatively high. Plans for the farm business should be made from season to season on the basis of normal yields, the probable prices for different farm products, and the costs of materials, extra hired labor, seed, twine, etc., necessary for carrying out the different plans. That plan of operation should be chosen which, upon this basis, seems most certain to give the best results.

By renting or buying more land a farmer can grow more feed crops and keep more livestock without reducing the acreage of wheat grown. Many farmers may find it advisable to do this. The exact com-

bination in which crops and livestock should be combined in making up the farm business depends primarily upon the managerial ability of the farmer. By comparing the possible returns that different plans of operating will give for the use of his land, labor, equipment, horses, and other resources, he is in a position to choose the one that will average the most profit. In the example shown, the addition of livestock, and the crops to feed them, gave larger returns. The farmers of central Kansas who have been raising wheat to the exclusion of practically all other products will find that changes in this direction will increase their returns and provide a more regular income.

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